Sandia National Laboratories

Operated for the U.S. Department of Energy by
Sandia Corporation

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CAREER OPPORTUNITIES in Optimization and Uncertainty Quantification

New researchers are sought to join a strong team that is researching optimization and uncertainty quantification and deploying tools throughout the U.S. Department of Energy Tri-lab complex. Researchers are sought who have expertise in:

Continuous optimization algorithms over large-scale simulations

Experience designing optimization algorithms to perform well over poorly-behaved, non-analytic, large-scale simulations such as FEM analyses with millions of degrees of freedom is desired. In particular, integrating with large-scale C++ multiphysics simulation frameworks is a unique deployment emphasis for the group. Another key area for the group is dealing with problems with a high degree of uncertainty, such as robust and reliability-based design problems, using both probabilistic and non-probabilistic approaches. A growing area for the group is dealing with multiple objectives, and also large-scale non-engineering applications such as agent-based simulations and informatics.

Development skills in the following areas are also desired:

C++ software development and design for large-scale software frameworks and libraries

Massively parallel (distributed memory) scientific computing

Sandia National Labs frequently applies optimization to designs whose response is modeled by complex multi-physics simulations involving millions of finite elements. It is a special challenge to develop general-purpose parallel optimization algorithms for such applications. Help is sought for developing tools to facilitate problem definition, and for coupling parallel software frameworks and simulation codes. The next great leap in analysis fidelity is incorporating uncertainty into these already-difficult simulations. Sandia offers a unique set of challenging application problems for the researcher interested in the general areas of robust optimization or reliability-based design for uncertain models.

Sandia's Optimization and Uncertainty Estimation department is well known for its DAKOTA toolset, available as open-source under GNU GPL license. The department has unique expertise in the areas of simultaneous analysis and design, massively parallel optimization, surrogate-based optimization, and optimization under uncertainty. The department partners with other organizations within Sandia that specialize in discrete optimization, stochastic methods, and validation and verification of software codes. The department has dozens of partnerships with world-class universities and frequently hosts faculty for extended collaborations.

Sandia is a world leader in large-scale parallel computer systems, algorithms, software and applications. Sandia has a unique parallel computing environment, including some of the top supercomputers in the world: ASCI Red with 4500-nodes and 2.3-teraflops; Red Storm with 10,000-nodes and 40-teraOps, http://www.cs.sandia.gov/platforms/RedStorm.html; and many smaller research machines. Staff members work in a collaborative and highly multidisciplinary environment. Sandia values and rewards technical excellence and leadership. Sandia offers a stable work environment, and the opportunity to solve some of the world's most challenging and important computational problems. See http://www.sandia.gov or http://www.cs.sandia.gov/ or http://endo.sandia.gov/DAKOTA/ for more information.

Applicants must have completed an M.S. or Ph.D. in mathematics, computer science, engineering or operations research, and have academic or work experience specializing in the targeted areas. A familiarity with statistics, economics, decision theory or complex systems would be a plus. The proven ability to work in a collaborative, multi-disciplinary research environment is desired.

Applicants should send a resume, a statement of research interests, and the names of three references to Scott Mitchell; see letterhead for address. Electronic applications are preferred. Please reference TSR050557. Sandia has facilities in Albuquerque, NM and Livermore, CA. Sandia offers attractive compensation packages that are competitive with industry leaders. Sandia is an Equal Opportunity Employer. U.S. citizenship is normally required.